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finds genetically to be "fundamental apperception," which seems to be Kant's "transcendental unity" with a psychological body (p. 108). This, as well as the more particular categories, is evolved by natural selection, in accordance with the pragmatic principle of useful adaptation to environment (p. 111). Abstract reasoning is the best substitute we can find, in the absence of concrete verifiability; this furnishes the origin of the apparent independence of logic (pp. 118-120). There is really no *a priori* knowledge (p. 123). On the whole, the discussion, although difficult for a beginner, is a masterpiece of logical arrangement and clearness.

The fourth division, "Metaphysics or Ontology," first discusses the ontological problem. Monism is either materialism, spiritualism (panpsychism), monism of being (Haeckel) or of becoming (Mach, Avenarius). The author doubts the conservation of energy in psychical process, and inclines to accept Wundt's "creative synthesis" (p. 147). Panpsychism is condemned (unfairly, we believe) as not accounting for the physical. The author is a dualist and an interactionist; he regards will as the type of causation (p. 181). Pluralism is less completely discussed than other topics, inasmuch as radical empiricism does not seem to be understood. Its attempt to defend plurality from the point of view of immediacy is not mentioned (p. 184). In his discussion of the cosmological problem the author follows Paulsen, in the main.

The fifth division treats of *Aesthetics*; and the sixth, of *Ethics and Sociology*. In the opinion of the author, indeed, ethics is sociology. Its subject-matter is not "deportment," but "volition" (p. 241), "the evaluation of an act in its social significance" (p. 265). Strangely enough, he brings the problem of freedom under ethics, rather than under metaphysics. He upholds *psychological* freedom, or the "absence of the feeling of external or internal constraint;" but denies metaphysical freedom, or the view that acts are "outside the law of causality" (p. 256). As to sociology, so much does he value it that he says "the sociology of the future might well become the foundation of all philosophy" (p. 285).

From the "Concluding Reflections" many quotations might be cited to confirm our general estimate of the author's position. "Philosophy must return to the theory . . . of sound common-sense" (p. 293). "The ultimate object of knowledge is, after all, the preservation and improvement of life" (p. 300). Intellectualistic idealism is "an hypertrophy of the cognitive impulse" (p. 300). The universe is a vast will (pp. 306-307); and "the investigation of the laws of this divine will furnishes the sublime problem of all science" (p. 307). Is not this panpsychism? Or at least, is it not just a little above common-sense?

But, all criticisms apart, the book is a remarkable, and on the whole, a very just summary of philosophy. One finds it impossible, in a short review, to do justice to its historical perspective, and its logical arrangement of the problems. May it meet with the hearty welcome which it deserves.

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The Process of Abstraction: An Experimental Study, by THOMAS VERNER MOORE. University of California Publications in Psychology, 1, 2, 1910, pp. 73-197.

Following in the wake of the Würzburg school which has tried, during the past ten years, to study experimentally the higher thought processes, Moore attempts to determine experimentally the mental processes involved in the process of abstraction, or the formation of our general ideas. He seeks to discover how general ideas form and develop, and what mental processes are involved in their formation.

His method consisted in presenting to his subjects, a series of groups of geometrical figures so drawn and arranged that a common element constantly recurred in each group, while the other figures in the group were con-

stantly varied. As soon as the subject felt sure that the same figure had occurred more than once, he stopped the exposure-apparatus; he then described his state of mind during the experiment stating, especially, what it was that he first noticed in isolating and perceiving the common element.

It was found that the groups of figures thus exposed constituted something of a unit which underwent rather definite changes as the common element became isolated and perceived. That is to say, the elements of these groups had a different mental value after the common element had been perceived from what they had before. This made it possible to study the process of abstraction genetically. Four stages or steps in the process of abstraction were ascertained: (1) The breaking up of the groups of figures and the selection of the common element. (2) The process of perceiving or apprehending this common element. (3) Holding this common element in immediate memory, until (4) it was recognized as having occurred before. Each of these stages was made the subject of special observation, with a view to determining the mental processes involved.

On the first point, the breaking up of the group, and the isolation of the common element, nothing new was determined. Moore simply says that the selection of the common element depended upon the degree to which the repeated figure attracted the observer's attention. This step seems not to have been worked out in detail. No psychological history of the mental process actually employed in selecting the common element was obtained; but it was determined that, when the group was finally broken up, the common element always became accentuated at the expense of the surrounding elements, which seemed to be positively cast aside and swept more or less completely from the field of consciousness.

The second step, the perception the common element, was initiated by this breaking up of the group. The sensations aroused by the recurrent figure were attended to. This, at once, instituted a process of apperception or mental assimilation, by means of which the sensations were related or joined to one or more appropriate categories. A general idea that some kind of a figure (roundish, open, pointed, etc.) had been repeated, was the result; but no definite information about the shape or nature of this figure could be given. The figure was clearly apprehended but not in representative terms. "Mental images formed no essential part in this first apprehension of the figure." There was not even a more or less specialized general concept of the form of the figure perceived. After the knowledge that some kind of figure had been repeated, the memory of this fact usually lingered in consciousness until a clearer idea of the figure was formed. But this second idea of the common element might still be expressed in perfectly general and non-representative terms. It was only rarely represented in consciousness in imaginal terms, or accompanied by feelings of pleasantness or unpleasantness, strain, and the like. The third step in the perception of the common element was the acquisition of a correct idea of the figure and a clear knowledge of its shape; this stage was attended by doubt or error as to the orientation of the figure in the group. The fourth and last step in the perception of the common element involved forming a *correct* idea of the figure and its shape, with a true knowledge of its orientation in the group. It is, therefore, clear that the perception of the common element in abstraction proceeded from that which was general and vague and imageless to that which was particular and definite and clear. Mental images belonged only to the later and more unessential stages of the perception of the common figure.

After the common element had been isolated and perceived, it had to be held in immediate memory until it could be certainly recognized as having been seen before. This memorial process was investigated, and three factors were found to affect the memorial permanency of the common element: (1) The method of memorial visualization, motorization, association, analysis, etc. (2) The appearance and noting of impressions

between the time when the common element was first noticed, and its final perception and recognition. (3) The focality of the common element, when perceived. The most economic method of memorizing the common element, and the method most often used, was that of association and analysis. Analyzing the vague idea of the figure "to see what it was made up of, what it resembled, its possible use," etc., was found to be the most effective method of fixing it. This mental analysis, while never put into actual words or representative terms, was found to have a greater effect for memorial permanency than the combined effects of any visual and motor imagery employed by the subjects. "Subjects often remarked that figures were remembered in this way when they were attempting to memorize them by visualization." But the method of memorizing is not the only element that influenced the memorial permanency of the common element. Succeeding impressions had a positive tendency to impair the subject's memory for the common element. In every case, the perception of new figures tended to obliterate from memory the figure already perceived. Then, too, the farther the figure was from the focal point of vision when perceived, the less accurately could it be held and reproduced.

The last stage in the process of abstraction,—the *recognition* of the common element, or the knowledge that the figure had been seen before,—was an entirely different mental process from the selection, perception or retention of this common element. It often occurred that the figure which the subjects had in mind for some time was later recognized as the common element. "Certainty that the figure apprehended had been seen before was what was dawning upon the subject during the interval when his mind was thus being fully made up." In the development of this cognitive certainty there was (1) an intimation or feeling of weak probability that a figure had been seen before; (2) a stage of actual probability that a common element was present; (3) a final stage of certainty. While the process of recognizing was thus distinct from the process of perceiving the common element, it must not be inferred that the process of perception was regularly completed *before* the process of recognition began. "What actually happened was that almost any degree or certainty of recognition might co-exist with any degree of the perfection of perception." There might be (1) an intimation of a common element, without any knowledge of its form; (2) probability that a common element was present, but an imperfect idea of its form; (3) probability that a common element was present, and a true idea of its form; (4) certainty that a common element was present, but an imperfect idea of its form; (5) certainty that a figure was repeated without any knowledge of its form. These results were obtained by stopping the apparatus, during some of the experiments before absolute certainty had developed. In this way, cross-section analyses of the cognitive consciousness were obtained which showed the process at all stages of its development. The subjects were also shown discs without a common element, and discs containing more than one common element, to insure accurate observation. Certain recognition, is, therefore, not dependent upon perfect perception; neither is it dependent upon a comparison of mental images. It often took place without the formation of any mental image of the thing that was recognized. "A person might be certain that a figure was repeated, and have a perfect image of the figure, or an imperfect image, or no image at all." "A comparison of mental images is not the normal method of recognition."

In this process of recognition, an element of certainty or uncertainty was always involved. This implied assent or doubt, and, consequently, an actual or suspended judgment. The final question, therefore, is to determine the psychological basis of this cognitive judgment. How was this judgment or feeling of certainty arrived at in the experiment? Moore's answer to this question is theoretical. The actual development of this feeling of certainty was not determined; but "recognition took place not only when there was no revived mental image of the past perception, but

when the present perception itself was too imperfect to leave any trace of mental imagery on the mind" (p. 173).

The real basis of this recognitive certainty, "was the series of associated concepts or appropriate mental categories which the sensations of the common element aroused." "The subject's first idea of the common element was made up of the sensations from the repeating figure plus the concepts or mental categories which these recalled. These two processes fused and formed a new psychical product,—the subject's first apprehension or idea of the common figure. When the common element was seen again, a new percept was formed and assimilated to the old." Just how this occurred Moore does not say. "The old series of associated concepts readily falls in with the new, and gives rise to the feeling of familiarity and certainty." How or why, Moore does not determine. "The new concepts thus formed readily fit in with the old. There is nothing to jar the process of their assimilation, but often a re-enforcement of at least some members of the associated train of concepts." The figure's series of associated concepts, therefore, not only formed the chief factor in perception, and the factor by means of which the subjects recalled the figures, but also the factor that enabled them to recognize the figure as having occurred before (p. 175). These mental categories or concepts were also the final product of the whole process of abstraction.

Two things were determined about this final product of abstraction or learning: (1) That the mental categories and concepts formed in the process of this experiment were the result of the subject's experience with the repeating figures of the groups. All other categories and concepts possessed by the individual are products of the individual's past experience in the process of learning. (2) These mental categories or concepts represent compound psychic processes which are separate and distinct from mental images and feelings,—a result supported by the author's careful summary of related studies in the psychology of thought with which his study begins.

The character and nature of these concepts was not determined or described; and the reader seeks in vain for a more detailed psychological history of the formation and development of the particular concepts formed in the course of the experiment. One is curious to know the nature and origin of the imageless mental contents arrived at; and how these actually operated in the process of forming other mental categories and concepts. The reviewer feels that a more detailed psychological history of the formation and development of the particular concepts formed in the course of the experiment would have told us much about the nature and origin of these imageless processes. The author should have told us exactly how the common element was perceived; he should have determined, by controlled and repeated observations, exactly how the feeling of recognitive certainty was acquired, how the common element was actually selected, etc.,—a very difficult but not impossible task which must be squarely met if we are to obtain the psychological facts. What, to the reviewer, seems to be needed most in all such studies as this is a complete psychological history of the processes studied. We should be supplied with enough accurate, cross-section analyses of the mental processes involved to enable us to trace, with assurance, the whole course of their development. This is a method and point of view, which is not clearly apprehended in the present study. In fact, the reviewer feels that the author is at times describing logical deductions instead of psychological facts; that he is trying to tell how he thought certain processes worked instead of giving us actual verified observations from his subjects. Nevertheless, Moore has done a careful and important piece of work. His study is, without doubt, the best in the field, for it not only makes an important contribution to the ever-growing psychology of the higher thought processes, but it also raises an array of definite problems for future work, some of which I have tried to indicate in this review.

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